

# **Trip Report 2003**

## **Coordination of Mexican Bark Beetle Studies**

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*Pinus hartwegii*

## TRIP REPORT 2003

### Coordination of Mexican Bark Beetle Studies

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We initiated studies to evaluate verbenone, the most promising pheromone for control of *Dendroctonus* bark beetles in North America, in six sites in Mexico in 2003. This first year represents an effort to coordinate evaluations across the country, standardizing study execution and enabling us to extrapolate results from one region to another. These studies are being conducted with Instituto Nacional de Investigaciones Forestales y Agropecuarias (INIFAP) researchers as well as with professors from three Mexican universities: Universidad Autónoma Chapingo, Colegio de Postgraduados en Ciencias Agrícolas (COLPOS), and El Colegio de la Frontera Sur (ECOSUR). In addition, professors from Universidad Autónoma de Aguascalientes are involved in the study at a site in Sierra Fría. These sites represent most of the major forest types in Mexico, with the exception of northern Mexico, which will be dealt with more fully in 2004-2005. The sites also encompass the most damaging of bark beetle species in Mexico, *Dendroctonus mexicanus*, *D. adjunctus*, *D. pseudotsugae*, and *D. frontalis*. As the research moves to encompass northern Mexico, *D. rhizophagus*, *D. brevicornis*, *D. ponderosae*, and *D. jeffreyi* will be included. The latter two species are currently killing large numbers of federally-protected pines in Baja California (mountain ranges of Sierra de Juárez and Sierra San Pedro Mártir), and are of increasing concern.

The first year of our work focused on determining which optical isomer of verbenone is active for each beetle species, because the pheromone release devices are marketed in both forms. For example, in the United States the plus isomer is more effective for the southern pine beetle, while the minus isomer is more effective for the western pine beetle and the mountain pine beetle. Once we have determined which isomer is more active for a given species or population, we will test the pheromones in forest stands using one of two commercially available pheromone-releasing systems: 1) pouches made of polyethylene or 2) microencapsulated sprays that release the pheromone over time. Those evaluations are planned for 2004-2005.

In May 2003 we traveled to Mexico City to meet with researchers from COLPOS, Chapingo, and INIFAP, where we laid out the study designs, explained the protocols, and provided pheromones for testing. We also traveled to one of the study sites, Atlautla, in the State of Mexico (Figures 1-7). We then traveled to Tapachula, in the State of Chiapas, where one of the campuses of ECOSUR is located. We met with Dr. Jorge Macías Sámano, and then traveled with him to one of the study sites in the Parque Nacional Lagunas de Montebello (Figures 8-10). The combination of fire, bark beetles, cattle grazing, and agriculture are responsible for increased forest fragmentation in the State of Chiapas. Near the National Park, forest stand conversion is often initiated by fire, which induces bark beetle attack. Once the trees are killed by bark beetles, the conversion to grazing and crop production is usually permanent. In this way, the forests of Mexico are being steadily lost to cash crop agriculture.

Travel expenses for this trip were largely reimbursed by the Forest Health Protection International Activities Team, freeing up the International Program funds for the purchase of pheromones, traps, and field supplies.

## **Institutions, cooperators, locations, and insects/hosts studied in FY2003:**

### **Universidad Autónoma Chapingo**

(David Cibrián Tovar, Tulio Méndez Montiel, and Rodolfo Campos Bolaños)

**Amatepec, Valle del Bravo, Estado de México** (Hwy 134 east of DF, south at Tejupilco past Ixtapan to Amatepec)

*Dendroctonus frontalis* in *Pinus oocarpa* and *Pinus pringlei*

**Atlautla**, near Popocatepétl in **Estado de México**

*Dendroctonus mexicanus* in *Pinus teocote*

### **Instituto Nacional de Investigaciones Forestales y Agropecuarias (INFIAP)**

(Guillermo Sánchez Martínez, Pabellón de Arteaga, Aguascalientes, and Ignacio Vasques Collazo, Uruapan, Michoacán)

**Sierra Fría, Estado de Aguascalientes**

*Dendroctonus mexicanus* in *Pinus teocote* and *Pinus leiophylla*

**Nuevo San Juan Parangaricutiro, Estado de Michoacán**

*Dendroctonus* spp. in *Pinus teocote* and *Pinus michoacana*.

### **Colegio de Postgraduados en Ciencias Agrícolas (COLPOS)**

(Armando Equihua Martínez, Insituto de Fitosanidad)

**Estado de Chihuahua** (exact location to be determined)

*Dendroctonus pseudotsugae* in *Pseudotsuga menziesii*

**Desierto de los Leones, Estado de México**

*Dendroctonus adjunctus* in *Pinus pseudostrobus*

### **El Colegio de la Frontera Sur (ECOSUR)**

(Jorge Macías Sámano, Ecología de Insectos Forestales)

**Parque Nacional Lagunas de Montebello, Estado de Chiapas**

*Dendroctonus frontalis* in *Pinus oocarpa*

**San Pedro el Alto, Estado de Oaxaca**

*Dendroctonus mexicanus* in *Pinus oocarpa* (potential site)



**Fig. 1.** *Equipo* (team) from Chapingo: (left photo) Student, Rodolfo Campos, Tulio Méndez, Fernando (government forester from the State of Mexico), Rosalillo Mejia, Jack Stein; (right photo) Rodolfo Campos, Fernando, Nancy Gillette, and Tulio Méndez.



**Fig. 2.** *Pinus leiophylla* and *Pinus teocote* killed by *Dendroctonus mexicanus*. Bark beetle attacks were triggered by fire damage resulting from a lightning strike.





**Fig. 3.** Pitch tubes (left and center) and adult *Dendroctonus mexicanus* (right).



**Fig. 4.** Galleries of *Dendroctonus mexicanus* in *Pinus leiophylla*.





**Fig. 5.** Tulio Méndez searching for live beetles (top) and felled trees killed by *Dendroctonus mexicanus* (bottom).





**Fig. 6.** Workers debarking felled trees to kill bark beetles.



**Fig. 7.** Stacked and sanitized (pesticide-treated) logs.



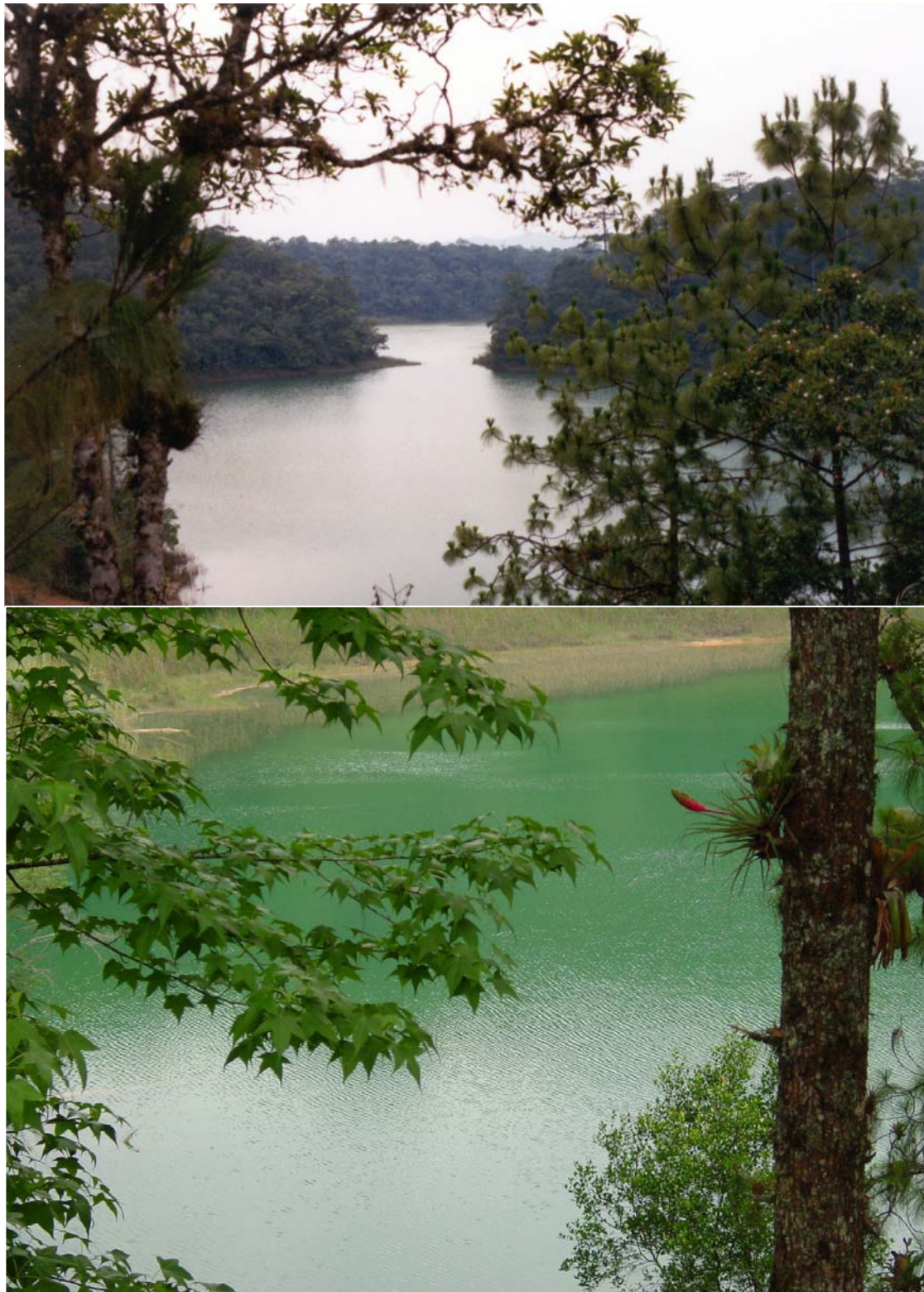


**Fig. 8.** Cooperators Alicia Niño (graduate student), Jorge Macías (ECOSUR), and Jack Stein (FHTET) in the pine-oak-liquidambar forest of Lagunas de Montebello.



**Fig. 9.** The field crew (clockwise from left) Jorge, Alicia, and Raúl walking to a stand of *Pinus oocarpa* trees killed by *Dendroctonus frontalis* (seen in the distance), Jorge looking for bark beetles, and graduate students Alicia and Raúl installing multiple funnel traps baited with bark beetle pheromones at Lagunas de Montebello.





**Fig. 10.** Mixed stands of *Pinus oocarpa*, *Liquidambar macrophylla*, and *Quercus* spp. surround a chain of lakes in Parque Nacional Lagunas de Montebello, Chiapas (note bromeliad on bole of pine in lower photo).